



PTO/SB/08a (08-03)

Approved for use through 07/31/2006. OMB 0651-0031

U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449A/PTO

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

(Use as many sheets as necessary)

Sheet 1 of 5

Complete if Known

Application Number	10/711279
Filing Date	September 7, 2004
First Named Inventor	Gary Haughton
Art Unit	
Examiner Name	
Attorney Docket Number	93177pusB

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code ² (if known)			
→ R/S ← All considered R/S		US- 6,070,348	06-06-2000	Bianchetti	
		US- 6,007,237	12-28-1999	Latto	
		US- 5,947,784	09-07-1999	Cullen	
		US- 5,813,760	09-29-1998	Strong	
		US- 5,738,018	04-14-1998	Burnett	
		US- 5,100,242	03-31-1992	Latto	
		US- 5,052,813	10-01-1991	Latto	
		US- 4,534,914	08-13-1985	Takahashi et al.	
		US- 4,440,616	04-03-1984	Houseman	
		US- 4,439,300	03-27-1984	Houseman	
		US- 4,319,971	03-16-1982	Good et al.	
		US- 4,302,318	11-24-1981	Mock	
		US- 4,189,362	02-19-1980	Dotson	
		US- 4,169,681	10-02-1979	Kato	
		US- 4,125,439	11-14-1978	Fleischmann et al.	
	US- 4,054,503	10-18-1977	Higgins		

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Foreign Patent Document			Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ³
		Country Code ²	Number ¹	Kind Code ³ (if known)				
R/S	F1	DE	75 04 145	U	06-19-1975	Muller		
R/S	F2	SU	858 898	A	08-30-1981	Umarnskii		
R/S	F3	SU	967 541	A	10-23-1982	Fomenko		
R/S	F4	FR	2 605 244	A	04-22-1988	Bionaz		
R/S	F5	WO	02/083280	A1	10-24-2002	Arnosco Technology Ltd.		

Examiner
Signature

T. Soohus

Date
Considered

6-18-05

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. ¹ Applicant's unique citation designation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449A/PTO

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

(Use as many sheets as necessary)

Sheet 2 of 5

Complete if Known

Application Number	10/711279
Filing Date	September 7, 2004
First Named Inventor	Gary Haughton
Art Unit	
Examiner Name	
Attorney Docket Number	93177pusB

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code ² (if known)			
TS		US- 3,912,237	10-14-1975	Ostberg et al.	
		US- 3,560,366	02-02-1971	Fisher	
		US- 3,214,148	10-26-1965	Thomas	
		US- 2,661,938	12-08-1953	Kuentzel et al.	
		US- 2,615,692	10-28-1952	Muller	
		US- 2,557,503	06-19-1951	Hogaboom, Jr.	
		US- 2,064,402	12-15-1936	Bannister et al.	
		US- 1,408,596	03-07-1922	Heinrich	
		US- 1,345,312	06-29-1920	Blake	
		US- 567,503	09-08-1896	Pelatan & Clerici	
		US- 52,890	02-27-1866	Ryerson	
		US-			
		US-			
		US-			
		US-			
		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Foreign Patent Document			Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	7 ⁶
		Country Code ³	Number ⁴	Kind Code ⁵ (if known)				
TS	F6	JP	11 184 420	A	07-09-1999	Mitsubishi Electric Corp.		
TS	F7	GB	1 147 378	A	04-02-1969	Davis		
TS	F8	JP	63104638		05-10-1988	Yoshida Masatoshi		
TS	F9	DE	7416500		08-22-1974	Messerschmitt- Bolkow-Blohm		

Examiner
Signature

Ti Soohoo

Date
Considered

6-18-05

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. ¹ Applicant's unique citation designation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁶ Applicant is to place a check mark here if English language translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449A/PTO

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

(Use as many sheets as necessary)

Sheet 3 of 5**Complete if Known**

Application Number	10/711279
Filing Date	September 7, 2004
First Named Inventor	Gary Haughton
Art Unit	
Examiner Name	
Attorney Docket Number	93177pusB

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code ² (if known)			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Foreign Patent Document			Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁶
		Country Code ³	Number ⁴	Kind Code ⁵ (if known)				
PS	110	FR	1 604 693	A	01-03-1972	Institut Merieux		

Examiner
Signature

PS Sodhoo

Date
Considered

6-18-05

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. ¹ Applicant's unique citation designation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449B/PTO

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

(Use as many sheets as necessary)

Sheet

4

of

5

Complete if Known

Application Number

10/711279

Filing Date

September 7, 2004

First Named Inventor

Gary Haughton

Art Unit

Examiner Name

Attorney Docket Number

93177pusB

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
TBS	N1	TURNER, J.S. Intermittent Release of Smoke from Chimneys. Journal of Mechanical Engineering Science 1960, Vol. 2, No. 2, pages 97-100.	
TBS	N2	KENDIG, F. The Science of Smoke Rings and Doughnuts. Saturday Review, March 18, 1972, pages 40 and 44.	
TBS	N3	MAXWORTHY, T. Turbulent Vortex Rings. J. Fluid Mech. 1974, Vol. 64, Part 2, pages 227-239.	
TBS	N4	BAIRD et al. Velocity and Momentum of Vortex Rings in Relation to Formation Parameters. The Canadian Journal of Chemical Engineering, February 1977, Vol. 55, pages 19-26.	
TBS	N5	MAXWORTHY, T. Some Experimental Studies of Vortex Rings. J. Fluid Mech. 1977, Vol. 81, Part 3, pages 465-495.	
TBS	N6	SAFFMAN, P.G. The Number of Waves on Unstable Vortex Rings. J. Fluid Mech. 1978, Vol. 84, Part 4, pages 625-639.	
TBS	N7	ROHATGI, A. Mixing Effects and Hydromatics of Vortex Rings. Ph.D. Thesis at McMaster University, Hamilton, Ontario, June 1978.	
TBS	N8	PULLIN, D.I. Vortex Ring Formation at Tube and Orifice Openings. Phys. Fluids 22(3), March 1979, pages 401-403.	
TBS	N9	ROHATGI et al. Mixing Effects and Hydromatics of Vortex Rings. The Canadian Journal of Chemical Engineering, August 1979, Vol. 57, pages 416-424.	
TBS	N10	DIDDEN, N. On the Formation of Vortex Rings: Rolling-Up and Production of Circulation. Journal of Applied Mathematics and Physics (ZAMP) 1979, Vol. 30, pages 101-116.	
TBS	N11	Ontario Ministry of the Environment, Water Resources Branch, Province of Ontario. Hamilton Harbour Study 1977, March 1981, pages 1-A11.	
TBS	N12	ROHATGI et al. Gas Absorption at a Liquid Surface Agitated by Vortex Rings. The Canadian Journal of Chemical Engineering, June 1981, Vol. 59, pages 303-309.	

Examiner
Signature

TB Soohco

Date
Considered

6-18-05

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation designation number (optional). ² Applicant is to place a check mark here if English language Translation is attached. This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449B/PTO

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

(Use as many sheets as necessary)

Sheet

5

of

5

Complete if Known

Application Number

10/711279

Filing Date

September 7, 2004

First Named Inventor

Gary Haughton

Art Unit

Examiner Name

Attorney Docket Number

93177pusB

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
TCS	N13	GLEZER, A. An Experimental Study of a Turbulent Vortex Ring. Ph.D. Thesis at California Institute of Technology, Pasadena, California, 1981.	
TR	N14	SU 858 898B (UMANSKII, M.P.) 1981.08.30. (abstract), Soviet Patent Abstracts, Week 198225, London: Derwent Publications Ltd., AN 1982-51962E.	
TR	N15	SU 967 541 A (FOMENKO, Y.) 1982.10.23. (abstract), Soviet Patent Abstracts, Week 198334, London: Derwent Publications Ltd., AN 1983-745919.	
TR	N16	AHMAD et al. Mixing of Stratified Liquids. Chem. Eng. Res. Des. May 1985, Vol. 63, pages 157-167.	
TR	N17	LATTO, B. "New Mixer for Slurries and Stratified Fluids" In: Proc. 12 th Int. Conf. on Slurry Technology: March 31-April 3, 1987, New Orleans, Louisiana, U.S.A.. Edited by B. Sakkestad. Coal & Slurry Tech. Assoc., 1988, pages 165-73.	
TR	N18	JP 63 104638 A (MASATOSHI). Patent Abstracts of Japan, Vol. 12, no 344 (C-528), 1988.05.10 (abstract).	
TR	N19	LATTO et al. Mixing of Thermally Stratified Fluids by Injecting a Series of Vortex Rings - A Numerical Simulation. Trans IChemE, September 1990, Vol. 68, Part A, pages 457-463.	
TR	N20	LATTO et al. "Use of Vortex Rings for Mixing". In: Industrial Applications of Fluid Mechanics 1990, ASME, New York, FED, Vol. 100, pages 79-86.	
TR	N21	HUA, F. Numerical Simulation and Experimental Study of the Behaviour of Vortex Rings. Ph.D. Thesis at McMaster University, Hamilton, Ontario, 1994.	
TR	N22	JP 11 184 420 A (MISTUBISHI ELECTRIC CORP.) 1999.07.09 (abstract). Japan Patent Abstracts, Section PQ, Week 199938, London: Derwent Publications Ltd., Class P85, AN 1999-448427.	
TR	N23	JP 11 184 420 A (MISTUBISHI ELECTRIC CORP.) Patent Abstracts of Japan, Vol. 1999, no. 12, 1999.07.09 (abstract).	

Examiner
Signature

T. Soohoo

Date
Considered

6-18-05

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation designation number (optional). ² Applicant is to place a check mark here if English language Translation is attached. This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.